

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 63.]

MARCH.

[1892.

CCXXXII.—THE SPANISH BROOM AS A FIBRE PLANT.

(*Spartium junceum*, L.)

The well-known Spanish Broom of gardens, *Spartium junceum*, L. (*Genista juncea*, Lam.), is a native of the south of Europe, and it is found wild in Spain, Portugal, the south of France, Italy, and Greece. It is a hardy shrub, 5 to 8 ft. in height, with upright round branches of a deep green colour. It has a few lance-shaped leaves, which soon fall off. The flowers are large but not numerous. They are disposed in terminal racemes, and are of a deep yellow colour and sweet scented. Loudon, *Arboretum et Fruticetum Britannicum* (ed. 1838), p. 576, gives a full account of this plant and its cultivation in this country. "In Britain," he says, "the plant is solely regarded as an ornamental shrub, having the appearance of an evergreen from its smooth, dark green shoots and fastigate form, even in winter, when without leaves."

It is figured in the *Botanical Magazine*, pl. 85; and in Sibthorp's *Flora Græca*, pl. 671. As the generic name implies (*sparton*, cordage), the plant is known to yield a fibre. It has long been regarded as the material of cordage, nets, bags, and even of sails, which were in use by the Greeks, Romans, and Carthaginians. Owing to the more abundant and cheaper materials prepared from cotton and hemp, the use of the Spanish Broom as a fibre plant has in recent times become confined to remote parts of France and Italy, and even there the industry is gradually becoming extinct.

The plant thrives in the most sterile soils and in localities where few other kinds of vegetation are able to survive. It will grow equally well either in poor sandy soils or in those of a rocky and arid character. The young shoots are used as a winter fodder for sheep and goats. The flowers contain a large amount of honey and are attractive to bees. They also yield a dye. In France the plant is known as *Genêt d'Espagne*. An allied plant, the common English Broom, *Cytisus scoparius*, Link. (*Spartium scoparium*, L.), known as *Genêt à balais* or *le grand*

Genét, is also occasionally used in France for fibre purposes, but its value in this respect is small compared with that of the Spanish Broom. In regard to the latter, Loudon discusses its economic uses as follows:—

“ In Italy and the south of France a very good cloth is manufactured from the fibres of this plant, *Spartium junceum*. The shoots are cut over in the course of the month of August, and, after having been made up into little bundles, are dried in the sun. These are afterwards beaten with a mallet, and then steeped in water for three or four hours; after this they are steeped in a ditch, among water and mud, for eight or nine days, and then taken out and washed, which operation has the effect of separating the parenchyma from the fibres. The bundles are then opened, and thinly spread out to dry, after which they are combed in the manner of flax; and the better part is laid aside for being spun, and woven into sheets, table linen, or shirts; the remaining part being used for sacking or for stuffing mattresses. In various parts of France, Italy, or Spain, where neither hemp nor flax is grown, owing to the poverty of the soil, *Spartium junceum* is found an excellent substitute. In Italy, about Monte Cassiano, advantage is taken of a hot spring, by alternately immersing the shoots in it, and drying them in the sun, instead of the more tedious process of immersing them in cold water: when thus treated the parenchyma is rendered fit for separation, and the fibres for combing, in three or four days. The process is said by Rosier to be also performed with the *Cytisus scoparius*; though, according to Desfontaines, this is doubtful. In Languedoc sheep and goats are fed with the branches of *Spartium junceum* during winter, not because it is an excellent fodder, but because there is a general deficiency of forage at that season. Both in Spain and France, the shoots are used for forming baskets, and for tying up vines and other fruit trees. The bees are said to be very fond of the flowers, and the seeds are eaten with great avidity by poultry, partridges, &c. Medicinally, the flowers and leaves, in infusion, act as an emetic, or, in a larger quantity, as an aperient.”

In the *Paper Makers' Monthly Journal*, 1883, p. 414, it is stated that genista fibre “is stronger than hemp and has the advantage “that ropes made therefrom acquire greater strength when exposed to “moisture . . . Besides the fibre, the refuse or woody part can be “used for making cellulose that is adapted, owing to its strong texture, “for the manufacture of strong paper.” An inventor in the United States (quoted above) recommends the following treatment for extracting genista fibre:—

“The plants are, preferably in small bunches, placed in a tank or vessel filled with water, which is raised to a boiling heat. To this water is added, either before or during the boiling, lye in proportion of about 30 to 60 pounds to 800 pounds of the plants. The lye may be added to the water as such, already prepared, or caustic alkaline earths, in combination with carbonates of alkalies, may be employed, which form the lye in the water containing the plants. Carbonate of lime and carbonate of soda, in proportion of about 30 to 40 pounds of lime and 8 to 12 pounds of soda for 800 pounds of plants, are preferably employed. In the lye the plants are boiled for about five or six hours, after which they are left to cool, and are then removed from the tank or boiler. The plants are then ready to undergo the same treatment as flax and hemp, viz., that they may be steeped, dried, broken, and combed, to be subsequently employed for spinning, weaving, making cordage, yarn,

and for other purposes to be used in place of hemp, flax, jute, or similar plants."

In a recent number of the *Revue des Sciences Naturelles Appliquées* (5 April 1891) a short notice appeared respecting the use of the fibre of Spanish Broom amongst the peasants in the neighbourhood of Lodève, and in the remote hamlets in the mountains of Languedoc. The following correspondence shows that the industry at the present day is greatly reduced in some places, whilst in others it has become quite extinct.

The efforts made by Kew to obtain specimens of articles made from the Spanish Broom for the Museums of Economic Botany are also detailed.

ROYAL GARDENS, KEW, to FOREIGN OFFICE.

SIR,

Royal Gardens, Kew, 24 April 1891.

I AM desired by Mr. Thiselton-Dyer to enclose, for the information of the Secretary of State, an extract from the *Revue des Sciences Naturelles Appliquées*, April 1891, p. 555, on the subject of a fibre obtained from *Spartium* (*Genista*) *junceum*, L.

2. This fibre, although said to be used on the continent, is not so far represented in our collections in the Museums of Economic Botany at Kew. Mr. Thiselton-Dyer would therefore esteem it a favour, if the assistance of Her Majesty's Ambassador at Paris is sought to obtain specimens of the fibre, and of articles made from it, for the use of this establishment.

3. I am to add, that any reasonable expenses incurred in procuring the specimens will be defrayed by this establishment in usual course.

I am, &c.

(Signed) D. MORRIS.

Sir Villiers Lister, K.C.M.G.,
Foreign Office, S.W.

THE SECRETARY OF EMBASSY, PARIS, to FOREIGN OFFICE.

MY LORD,

Paris, July 16th, 1891.

IN receipt of your Lordship's despatch, No. 81, of the 28th of April last, asking me to endeavour to procure for the Kew Gardens, specimens of the fibre of the *Genista juncea*, and of articles manufactured from it, I addressed myself to the President of the Société d'Acclimatation, to obtain the same. He answered me that he was sorry to say that the Society did not possess specimens of the fibre and products woven from it; but he had written to a correspondent to obtain them, and hoped shortly to be able to send them. This he has not yet done, although his letter was dated the 5th of May.

I have, &c.

(Signed) E. H. EGERTON,
for the Ambassador.

The Marquis of Salisbury, K.G.,
&c. &c. &c.

THE SECRETARY OF EMBASSY, PARIS, to FOREIGN OFFICE.

MY LORD,

Paris, August 8, 1891.

WITH reference to the Earl of Lytton's despatch, No. 295, of the 16th ultimo, and to your Lordship's, No. 81, of the 28th of April, transmitting the expression of the wish of the Director of the Royal Gardens

at Kew to be furnished with products from the *Genista juncea*, I have the honour to enclose herewith copy of a letter from the "Muséum d'Histoire Naturelle," to Monsieur Tisserand, of the Ministry of Agriculture, to whom I had applied for information.

This letter says that the textile said to be derived from this "genista" is unknown in the competent departments, and that there has probably been a confusion on this subject in the publication of the Société d'Acclimatation. It might be well, the latter adds, to submit to experiment the rind of the *Genista juncea*, though this rind does not appear to possess the elements of strong or abundant textile fibre.

I have, &c.

(Signed) EDW. H. EGERTON.

The Marquis of Salisbury, K.G.,
&c. &c. &c.

ROYAL GARDENS, KEW, to FOREIGN OFFICE.

SIR,

Royal Gardens, Kew, August 12, 1891.

I HAVE the honour to acknowledge the receipt of your letter of August 10, transmitting a despatch from Paris (herewith returned) relative to a fibre stated to be extracted in France from *Genista juncea*.

2. The matter is not perhaps of first rate importance. But it is the business of this establishment to study local industries based on the use of vegetable materials, as sooner or later they are sure to be the subject of public inquiry.

3. M. Cornu, in his letter, speaks of the information published by the Société Nationale d'Acclimatation de France as being an old affair (il y a déjà longtemps). But, as a matter of fact, it is contained in the number of their *Revue* for April of the present year.

4. The statements are extremely specific or I would not have ventured to trouble the Foreign Office in the matter. Thus it is stated:—"Dans les villages pauvres du Bas-Languedoc, il est peu de maisons où l'on ne trouve du linge fabriqué en toile de Genêt." Again:—"Dans les Cévennes, où le commerce de ce textile se trouve localisé, on l'emploie également pour faire des cordes, &c."

5. M. Cornu suggests that there is a confusion with *Crotalaria*, the Sunn Hemp of India. This, if really the case, would be very curious.

6. Unless the information issued by the Société d'Acclimatation is purely imaginary, which, as it is a society of standing and repute is improbable, there is a local industry in France of which nothing is authentically known. Perhaps Her Majesty's Consul at Marseilles could find out what the nature of it really is.

7. In any case I must beg to express my thanks for the trouble that has been taken in the matter.

I am, &c.

(Signed) W. T. THISELTON-DYER.

Sir T. Villiers Lister, K.C.M.G.,
Foreign Office, S.W.

FOREIGN OFFICE to ROYAL GARDENS, KEW.

SIR,

Foreign Office, January 28, 1892.

I AM directed by the Secretary of State for Foreign Affairs to transmit to you, to be laid before the Director of the Royal Gardens, a

despatch from Her Majesty's Minister in Paris sending specimens of fibres of the *Genista juncea* referred to in the letter from this office of July 17 last.

I am, &c.
(Signed) T. V. LISTER.

The Assistant Director,
Royal Gardens, Kew.

[Enclosure.]

The SECRETARY OF EMBASSY, Paris, to FOREIGN OFFICE.

MY LORD,

Paris, January 27, 1892.

WITH reference to your Lordship's despatch of this Series, Number 81 of the 28th of April, and to my despatch, Number 295, of the 16th of July last, I have the honour to transmit herewith specimens of the fibre of the *Genista juncea*, L., and of articles manufactured therefrom as requested by Mr. Thiselton-Dyer.

These specimens have just been forwarded to me by Monsieur Geoffroy St. Hilaire, President of the Société Nationale d'Acclimatation de France, who informs me that he has had some difficulty in obtaining the specimens, their place of manufacture being limited to a few remote villages in the Cevennes.

I have, &c.
(Signed) EDW. H. EGERTON.

The Marquis of Salisbury, K.G.,
&c. &c. &c.

HER MAJESTY'S CONSUL, Marseilles, to FOREIGN OFFICE.

MY LORD,

Marseilles, January 27, 1892.

REFERRING to the Foreign Office despatch, No. 1, Commercial, of the 17th of last August, and its enclosures, which I return herewith, I have the honour to inform your Lordship that, through the kindness of M. Durand, Professor of the School of Agriculture at Montpellier, I have at length obtained and forwarded to the Foreign Office by the Peninsular and Oriental Company's steamer "Chusan" a parcel containing specimens of the *Genista juncea*, and of the articles made from it.

The plant, called locally *Génet d'Espagne*, grows naturally in the country, and it is only utilised for textile purposes at Lodève in the department of the Hérault, where the stuff is only made to order, and the industry, such as it is, is dying out.

I have, &c.
(Signed) CHARLES G. G. PERCEVAL,

The Most Hon. Consul.
The Marquis of Salisbury, K.G.,
&c. &c. &c.

The specimens mentioned in the above correspondence received at Kew afford ample material for arriving at a definite conclusion with regard to the origin and character of "Genista fibre." There is now in the Kew Museums a complete set, consisting of twigs, fibre in various stages of preparation, as well as yarns and coarse cloths. These were received from Mr. Consul Perceval. Besides, there is a

sample of coarse sheeting received from M. Geoffroy St. Hilaire, through the British Embassy at Paris. These fully illustrate the fibre industry connected with *Spartium* (Genista) *junceum*. A summary of the information obtained by the *Société Nationale d'Acclimatation de France* whilst engaged in meeting the wishes of this establishment, at the request of Her Majesty's Ambassador at Paris, is given in the *Revue des Sciences Naturelles Appliquées*, February 1892, p. 128.

It is somewhat singular to observe that the first efforts of the Society to secure specimens met with entirely negative results. Their correspondent at Nîmes, supposed to be one of the localities where the industry was still carried on, reported that not only did a Genista fibre industry not exist in that district, but he had never heard of such an industry. The plant itself was plentiful enough, and was used for feeding sheep along with needles of *Pinus sylvestris*. The Society for a moment began to doubt, as shown in the correspondence, whether after all Genista fibre was not a myth. The first satisfactory intimation was received from Professor Durand, of the School of Agriculture at Montpellier. This gentleman was ultimately successful, obtaining the specimens received at Kew through the exertions of Mr. Consul Perceval. M. Vilbouchevitch has seen recently in the neighbourhood of Lodève very fine specimens of yarn, and cloth made from the fibre. Some of the latter had been in use for 15 years, and it was of fine texture and beautifully bleached. An application to the mayor of Lodève elicited the fact that the industry had existed in his neighbourhood, but at the present time it was almost extinct. He forwarded, however, to the Society a series of specimens consisting of coarse cloth, mattress coverings, and sheeting; the specimens of the two latter were 80 years old. Of very recent manufacture he was able to send only some yarn.

It is evident that this interesting rural industry is fast dying out in France. It may be said to exist now only in very remote hamlets in the Cévennes. The inquiries made by Kew were therefore only just in time to secure the last specimens of cloth made in a laborious fashion before the days of rapid communication and the introduction of cheap cotton and other goods.

As an appendix to the article in the *Revue* above mentioned there is reprinted a memoir by M. Broussonet, entitled "Observations sur la culture et les usages économiques du Genêt d'Espagne," published in 1785. This gives a very interesting account of the industry as it existed in France more than a hundred years ago. In those days, in certain country districts, no other linen material was used except that obtained from the *Genêt d'Espagne*. The soil was too poor to grow cotton, flax, or hemp, and each household made its own cloth as it was wanted. It was never for sale in any quantity. A further memoir is reprinted relating to the use of *Cytisus scoparius*, Link., as a fibre plant. This was known as *Genêt à balais* or *grand Genêt*. The latter memoir was written by M. Yvard in 1787.

CCXXXIII.—BARK CLOTH OF UGANDA.

One of the most interesting of recent additions to the Museums of Economic Botany at Kew has recently been received from Sir John Kirk, G.C.M.G. It consists of a large sheet of bark cloth prepared by the

natives of Uganda from the inner bark of a species of *Brachystegia*, a small genus of trees belonging to the *Casalpinieæ* sub-order of the natural order *Leguminosæ*. The specimen is about 14 feet 6 inches long, 7 feet broad, and $\frac{1}{16}$ of an inch in thickness, and is of a reddish-brown colour, somewhat lighter on the under side, and is slightly crimped, probably the result of having been beaten out with grooved clubs.

The genus *Brachystegia* is confined to tropical Africa, and seems to be generally used by the natives as a source of bark cloth. Messrs. Speke and Grant in their expedition to the sources of the Nile, 1860-1863, made some interesting notes on the preparation and uses of cloth from this source, which it may be well to add. They say of *Brachystegia spicaformis*, Benth., that it is a light graceful tree of 20 to 40 feet high, common in rich forest, and is known in the Robeho mountains, Zanzibar, under the name of "M'chenga" or "M'nenga," the bark of which is made into kilts, cloths, hand-boxes, huge grain stores, matches, roofing for camp huts, &c.; they also add that a blood-red juice exudes on cutting the bark. These same explorers collected slight herbarium material at Keegwah in lat. $5^{\circ} 5'$ S. of what is so far determined as *Brachystegia tamarindoides*, Welw. var.? With the following note—"Native name 'Mecombo,' a first-class tree, as it has "so many uses. Tree 50 feet high, long naked trunk 9 feet in circumference. Foliage deep green. The wood is considered good for building. Its bark after being boiled and prepared is made into white sheets or cloths worn by the natives at 10° S. They also make canoes, boxes, matches, and ropes from it. Its honey is considered very superior in flavour and whiteness. First met with 30 miles from the sea; afterwards in the interior it was frequent. It is so plentiful at 6° S. lat. that our temporary huts were roofed with its bark, and my plants were protected by planks of its bark, which answered admirably, being light and stiff."

During Livingstone's Zambesi expedition in 1860 Sir John Kirk collected specimens of *Brachystegia appendiculata*, Benth., a tree of 20 to 40 feet high in the highlands of the Batoka country, where it is known under the name of "Motondo" (Setoka), the seeds being eaten by the natives; he also collected the same species near Muata Manja, $14^{\circ} 19'$ S. lat., and states that the fibrous bark is made into cloth by being beaten out. According to Dr. Meller this tree is known as "Chenga" near Zomba. The herbarium contains a specimen of *Brachystegia longifolia*, Benth., collected by Mr. J. Buchanan in the Shire highlands, and bears the following label—"Njombo. Bark cloth tree, wood very soft." Another herbarium specimen collected by Sir John Kirk near Kusuma, on the river Shire is labelled *Brachystegia*, *sp. nov.* and is described as being a good-sized tree with a fibrous bark which is used for cloth.

Since the above was written a report has been received through Sir John Kirk from Captain Lugard, the officer now commanding the Imperial British East Africa Company's troops in Uganda, in which the following reference is made to the bark cloth so extensively in use there of which the specimen now in the Kew Museum is an example.

Captain Lugard says, "The fig class [*Ficus*] is largely represented in Uganda "where they are cultivated for the sake of their bark from which "the native cloth is made." Thus, although there can be no doubt that the bark cloth used in Nyassaland and much of that used elsewhere, is derived from various species of *Brachystegia* the subject requires

further investigation, and it is most desirable that those in a position to investigate the question on the spot should send the leaf *at least* of the tree which they have seen used to yield the bark cloth with specimens of the cloth itself.

The seeds of what has been determined as a species of *Brachystegia* from Mashonaland and Manica have recently been received at Kew from the Agricultural Department of Cape Colony.

SECRETARY FOR AGRICULTURE, CAPE TOWN, to ROYAL GARDENS,
KEW.

SIR,

Cape Town, January 15, 1892.

I BEG to send you herewith some seed of a tree which is found over a large tract of country in Mashonaland and Manica. The person who brought the seed from there calls the tree by the name of "Mahogany," and describes it as a very beautiful one, and one of the most useful trees for South Africa, instancing the employment of the bark by the natives for making strong rope, bags (fit for grain), mats, beehives, &c. He states that the tree grows in every kind of soil and situation, in lowlands and on mountain tops.

I append a Memorandum by Professor MacOwan, until lately Director of the Botanic Gardens here, and should be glad to learn from you, upon identification of the seed, its precise classification.

I have, &c.

The Director,
Royal Gardens, Kew.

(Signed) W. J. J. WARNEFORD,
For Secretary for Agriculture.

[Enclosure.]

Mr. MacOwan says:—"It is a pity that an English name has been manufactured for this Mashonaland tree. The native name would have some sense and value as part of the history of the species.

"The Transvaal Boers call *Afzelia cuanzensis*, Welw., by the name of 'Mahogoni boom' (boom is Dutch for tree). But it is utterly different from this, its seed being ovoid, black, and each seated in a cup-shaped scarlet arillus. These seeds are often brought down as curiosities.

"I should rather expect this seed to be some species of *Bauhinia*, if a guess must be made. The packet might be sent to Kew, and a few tried here and at Durban."

CCXXXIV.—ROYAL SOCIETY OF NEW SOUTH WALES.

In publishing the following correspondence the Director of the Royal Gardens feels that he is only putting on record a mark of appreciation as handsome as it is spontaneous, on the part of one of the most distinguished of the Colonies of the Crown, of the usefulness of the official work which the Kew establishment could alone accomplish with the continuous and loyal assistance of every member of its staff.

THE SECRETARY OF THE ROYAL SOCIETY OF NEW SOUTH WALES
to ROYAL GARDENS, KEW.

The Society's House, Sydney,
December 23, 1891.

DEAR SIR,

WITH this, under separate cover, I have the pleasure to forward to you the Clarke Memorial Medal, which has been awarded to you by the Council of this Society, in recognition of your distinguished services in the cause of botanical science, and especially on account of your labours in connexion with the development and organisation of the Botanical Departments for the Colonies and India, at the Royal Gardens, Kew.

The Council fully appreciates the beneficial effects which this Colony (in common with the other British possessions) has already derived and will continue to derive from the foresight and scientific zeal you have displayed in the building up of the Colonial Departments of your institution; the Council is also aware of the assistance which the Department under your direction has given to institutions in Sydney, and is not unmindful of the fact that the first collections obtained for the Sydney Technological Museum were received from the Museum of the Royal Gardens, Kew.

The Council trusts that you will therefore accept the medal, as a token on the part of this Society, of the appreciation in which your work is held in Australia.

I am, &c.

(Signed) W. H. WARREN,
Hon. Secretary.

W. T. Thiselton-Dyer, Esq., C.M.G., F.R.S., &c.,
Director,
Royal Gardens, Kew.

DIRECTOR OF THE ROYAL GARDENS, KEW, to ROYAL SOCIETY OF
NEW SOUTH WALES.

DEAR SIR,

Royal Gardens, Kew, February 8, 1892.

IT was with mingled surprise and pleasure that I received your very kind letter of December 23, informing me that the Council of the Royal Society of New South Wales had done me the very signal honour of conferring upon me the Clarke Memorial Medal (which came safely into my hands at the same time).

I cannot but feel, however, that this distinction is one which has been earned rather by the institution over which I have the honour to preside than by any merit of my own. That, however, rather enhances than diminishes the satisfaction which I derive from it. The connexion between Kew and the Australian Colonies has always been peculiarly close; and I observe that this is no less than the third occasion upon which it has been recognised by your Society. That connexion began in the last century with Sir Joseph Banks, who, though not actually connected in any official way with Kew, was virtually its Scientific Director. It was resumed by the splendid work on the elucidation of the Australian Flora of my immediate predecessor in office, Sir Joseph Hooker, and it culminated in the preparation at Kew by Mr. Benthams of his classical description of the whole Australian Flora. It is, I feel, no small distinction to be associated in the eye of Australian scientific men with these two eminent recipients of the Clarke medal.

My own work has, I feel, been the much humbler one of continuing a tradition which, by the wisdom of the Government, has made Kew as much an imperial as a local institution. The services to which you allude have become so much a matter of routine that they scarcely seem to possess any exceptional merit. Their reward, if they deserve any, continually manifests itself in the kindness and sympathy which Kew never fails to receive at the hands of its Colonial correspondents. If anything is needed to lighten the continuous and perhaps sometimes onerous labours of the Kew staff, it is the feeling that they are working not merely for a limited section of the home community, but for the welfare and gratification of intelligent persons in every part of the Empire.

Kew has undoubtedly in the last half-century been successful in effecting much for the advancement of many material interests. Its highest work has, however, perhaps been accomplished in the encouragement and help which it has been able to afford to the cultivation of science in England beyond the seas. In Australia, with its splendid universities, energetic scientific societies, and fine Botanic Gardens, it sees an offshoot of the best home intellectual life which must always command its warmest sympathy.

I am, &c.

(Signed) W. T. THISELTON-DYER,
Director.

W. H. Warren, Esq.,
Honorary Secretary,
Royal Society of New South Wales.

CCXXXV.—OIL PALM FIBRE.

(*Elæis guineensis*, Jacq.)

The African oil palm is probably the most valuable of the indigenous plants of West Africa. From the pericarp of the fruits the well-known palm oil is prepared, while from the kernel of the nuts another kind of oil is extracted, scarcely less extensively used. According to Sir Alfred Moloney (*Forestry of West Africa*, p. 57), "although the palm oil industry has existed since 1790, if not before, the valuable palm kernels " on the Gold Coast did not attract attention until 1842 or 1843, when also " the ground-nut industry, at least in the Gambia, had its birth." The palm oil received in this country during the year 1885 amounted to 872,342 cwts., of the value of 1,172,862*l*. The palm kernels received during the same period amounted to 34,507 tons, of the value of 406,856*l*. We have therefore two important products from the African oil palm, the value of the quantity reaching the United Kingdom amounting to about one million and a half sterling yearly. To these we have now to add a third industry connected with the production of fibre from the leaves. It may, however, be mentioned that the immediate prospects of this new industry are not very hopeful. The fibre is extracted

in a laborious manner by the natives, and it is not, as yet, produced in commercial quantities.

Its extensive use locally for fishing lines and other purposes requiring great strength shows that it is one of the most valuable and lasting of tropical fibres. Very little, if anything, has hitherto been published respecting this fibre. Kew is indebted for the first specimens received for the Museums of Economic Botany to Mr. George Arbutnot Moore, Managing Director of the Palma Trading Company, Liverpool. These were received in June 1891. Since that time a very complete series of specimens illustrating the method of extracting the fibre with samples of twine and fishing lines have been received from the Government of Lagos. A small specimen was received from Mr. Scott-Elliot from Sierra Leone, January 1892.

MESSRS. IDE AND CHRISTIE to ROYAL GARDENS, KEW.

72, Mark Lane, London, E.C.,

June 23, 1891.

DEAR SIR,

WE have your favour of yesterday's date with specimen of fibre said to be prepared from the pinnæ of leaves of the African oil palm *Elæis guineensis*.

This fibre has been known to us for the last 15 years at least, but only from small samples such as you send us. It has never been received in merchantable quantity, to our knowledge, and hence no practical experiments have ever been made with it. Some spinners to whom it was shown, when the first specimens came to hand, stated their opinion that it was too hard and gritty to spin readily, but we are inclined to think this view might have been modified had they had the opportunity of testing it practically. It has great strength and fineness, and if really spinnable we would value it at 50*l.* to 60*l.* per ton to-day in London.

We should be pleased to learn there is a prospect of this fibre being prepared and sent home in quantity, so that its actual value might be ascertained, the small samples, mere handfuls, hitherto received having, as we have said, afforded no means of arriving at this.

We desire to thank you for sending us also some fresh pinnæ of *Elæis guineensis*, and it will afford the writer much pleasure if his examination of them should lead to his arriving at any further opinion of the fibre worth communicating to you.

Yours faithfully,
(Signed) IDE AND CHRISTIE.

D. Morris, Esq., M.A., F.L.S.,
&c. &c. &c.
Royal Gardens, Kew.

ROYAL GARDENS, KEW, to COLONIAL OFFICE.

Royal Gardens, Kew,
September 4, 1891.

SIR,

6. Another subject on which information might be obtained from the Government of Lagos is the extraction of fibre from the leaves of

the oil palm. A specimen of fibre, said to have been obtained from the flat blades or pinnae of the leaves of the oil palm was lately presented to the Museums of Economic Botany at Kew by Mr. G. A. Moore, of the Palma Trading Co., Liverpool. This fibre was of good quality, and was described by Messrs. Ide and Christie as worth from 50% to 60% per ton. No previous specimens of this fibre existed in the Kew Museums, and hitherto it has only reached this country in small and inconsiderable quantities. It is very desirable to obtain as much information as possible respecting the method adopted by the natives for the extraction of the fibre and the special purposes to which it is locally applied. It would also be desirable to obtain leaves in different stages of preparation, a good quantity of the raw fibre, and any articles such as cords, fishing lines, nets, or cloth made from the fibre, for the use of this establishment.

I have, &c.

(Signed) D. MORRIS,
Assistant Director.

The Hon. R. H. Meade, C.B.,
Colonial Office,
S.W.

MESSRS. IDE AND CHRISTIE to ROYAL GARDENS, KEW.

72, Mark Lane, E.C.,

January 21, 1892.

DEAR SIR,

WE are to-day favoured with the specimens of fibre and cord from the leaf of the oil palm (*Elais guineensis*), for which accept our thanks.

We should be glad to know if your correspondents at Lagos lead you to suppose that this material is, or could be, produced in merchantable quantity for export to this country. As we informed you in a previous letter (23rd June last) nothing but small samples have ever been seen here, and until a quantity of, say, 5 to 10 tons come home, no true estimate of the value can be arrived at.

Permit us to point out that the fibre should be sent untwisted and unplaited.

We fear the per-centage of fibre in the pinnae is small, and that the extraction must be attended with considerable difficulty.

We are, &c.

D. Morris, Esq., M.A., F.L.S., (Signed) IDE AND CHRISTIE.
&c. &c. &c.,
Royal Gardens, Kew.

In reply to the request for information respecting the methods pursued in extracting fibre from the leaves of the oil palm, a report was received through the Colonial Office from the Government of Lagos. It was prepared by Mr. Alvan Millson, the Assistant Colonial Secretary, and contains much interesting information on the subject. The fibre is extracted from the young leaves only. The process is identical with that used by natives in many parts of the world, and notably, as mentioned by Mr. Millson, by the Caribs of St. Vincent, and of the mainland of tropical America. Some Caribs who were attached to the St. Vincent's Court, at the Jamaica Exhibition, 1891, illustrated the process at the request of the Assistant Director of Kew, during his late

visit to Jamaica. There were several excellent specimens of similar palm fibre shown amongst the St. Vincent exhibits.

NOTES on the preparation of fibre from the pinnæ of the Oil Palm
(*Elais guineensis*).

The inner side of the leaflets of the oil palm contains a fibre almost as fine and tenacious as human hair. This fibre is called Awshawn by the Yorubas, Poaiñ by the Kroos, and N'K'aw by the Accras. It is used all along the coast of the Gulf of Guinea for making fishing lines. Its use is very similar to that of the Supa or Gri-gri palm (*Astrocaryum*) fibre with which the Caribs of the island of St. Vincent and the reef-fringed Honduras coast make their deep sea lines.

In the preparation of this fibre a considerable amount of skill is shown.

The pinnæ of the young leaves which have not been hardened by exposure are the only ones that can be made use of. If too old, the fibre cannot be separated from the tissue, and if gathered before the leaves have opened it has not sufficient strength to stand the rough handling which it has to undergo while in process of manufacture. If gathered at the right age the stripping of the fibre offers no difficulties although the process is both tedious and wasteful.

The mid-rib of the leaflet to be worked is separated with the thumb nail for about six inches of its length as shown in the accompanying series of specimens (Specimen A.).*

The pinna is then laid flat on the left hand with the smooth face upwards, as shown in Specimen B. and in the following sketch.

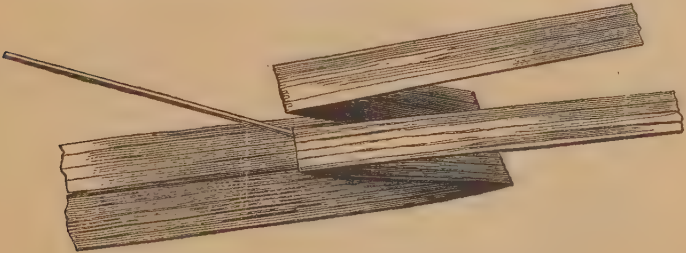


Fig. 1. First stage in preparation of oil-palm leaf for fibre.

It is next taken by the cleft end in the right hand, is laid over the worker's left thigh, and held below the fold in the left hand. The lower part of the folded part is firmly pressed against the leg with the side of the left thumb, the mid-rib being turned back under the same hand. The two loose ends are then pulled separately by the right hand, stripping the tissue from the fibre for the length of the fold, *i.e.*, about an inch (Specimen C.).

The leaflet is now drawn from left to right by the two loose ends across the thigh against which it is held by the flattened left palm, while the thumb of the same hand is inserted between the flap of tissue and the fibre, and is used to help in separating them by raising the

* These specimens are mounted for reference in Museum ii., Case 61.

remaining tissue with an upward and backward motion as it is pulled across the leg (Specimen D.).

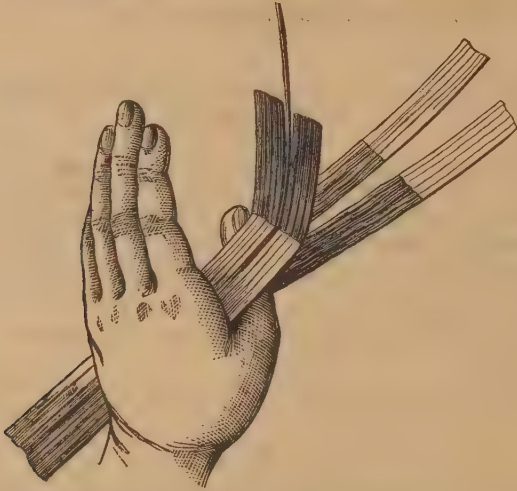


Fig. 2. Splitting of palm leaf to obtain the fibre. The latter is shown below the thumb in sketch.

The loose ends of the divided leaflet are then taken between the right finger and thumb with the fibre hanging over the first finger. The ends of the remaining tags of tissue are patted with the left forefinger for about half an inch of their length above where they join the fibre. This bruised portion is twisted round between the thumb nail and finger so as to separate it from the remaining tissue, and is pulled forcibly through the loose fibre, cleaning it thoroughly as it passes.

The tags with the fibre attached (Specimen E.) are now held in the right hand, and rolled on the thigh in pairs by the left palm so as to twist the fibre into double stranded twine. This primitive method of string making I have noticed also in Central America and among the peasantry in Scotland. Three of these double strands are next made into a cord, and holding the loose green tags of tissue one at a time between the thumb and forefinger of the left hand the remaining fibre is drawn out (Specimen F.) and rolled up on the thigh so as to complete the cord (Specimen G.). The cords are plaited into pigtails, and are hung up in the shade to dry (Specimen H.).

After they are thoroughly dried the short lengths are made into lines by rolling on the leg and inserting new lengths from time to time (Specimen I.).



Fig. 3. Sketch illustrating method of preparing fine cord and fishing lines from oil-palm fibre.

The method of insertion, as roughly shown in the above sketch, is unusually clumsy, but has the advantage of strength. In the finer lines the inserted pieces are frayed out at the end, and worked into the material in the usual manner.

So far as can be ascertained the only use to which this fibre is put is the making of fishing lines and fine cords. It would appear to be too costly for native cloth, net or bag making. The following results of actual experiments will serve to show the tedious and expensive nature of the process which has just been described.

A day's hard work is counted well spent on the production of six ounces of fibre from 36 pounds of the raw material. Estimating the value of labour to the native at not more than 3*d.* a day, and leaving out of consideration the time expended in collecting and sorting the leaves in the forest, the actual cost of this material to the producer cannot be calculated at less than 75*l.* a ton. It is therefore clear that it would be impossible to develop an export trade in this article at the present rate of European prices.

(Signed) ALVAN MILLSON,
Assistant Colonial Secretary.

CCXXXVI.—SOURCES OF RUBBER SUPPLY.

Para rubber is the produce of *Hevea brasiliensis*, Muell. Arg., a tree belonging to the natural order *Euphorbiaceæ*. The rubber is obtained from incisions cut through the bark, from whence the sap trickles into small bowls and is finally cured by being ladled on to a paddle-shaped implement and held over a stove in which Urucury Nuts (*Maximiliana regia*) are burnt as the fuel. In Museum No. 1, Case 94, will be found a fine series of articles used in collecting and preparing this rubber for export, and also numerous samples of the rubber. In 1891 the estimated export of Para rubber amounted to 17,700 tons, of which 6,000 tons were imported into this country.

A sample of rubber from *H. brasiliensis*, grown at Mergui, India, was reported upon in this country in 1889 as worth 1*s.* 11*d.* per lb.

Ceara rubber or "Ceara Scrap" is afforded by *Manihot Glaziovii*, Muell. Arg., a tree native of South America and belonging to the natural order *Euphorbiaceæ*. The imports of this rubber into this country amounted to 180 tons in 1891. In Case 96, Museum No. 1, will be found samples from Brazil, and also from plants introduced into Ceylon, Zanzibar, and Natal.

Mangabeira or Pernambuco rubber is extracted from a small tree (*Hancornia speciosa*, Gomez.) of the natural order *Apocynaceæ*. Specimens of this rubber are shown in Case 72, Museum No. 1.

The principal source of Central American rubber is *Castilloa elastica*, a large forest tree of the tribe *Artocarpeæ* of the natural order *Urticaceæ*. It affords the Ule of British Honduras as well as Nicaragua, Guatemala, Mexico, and Guayaquil rubbers. The total imports of Central American, West India, Columbian, Carthagena, and Guayaquil rubbers during the year 1891 amounted to 100 tons. See Case 100, Museum No. 1.

Esmeralda of Guiana may perhaps be afforded by *Hevea* sp. or *Sapium* sp. of the natural order *Euphorbiaceæ*.

Columbian india-rubber and "Carthagena" are one and the same thing, as is pointed out in the *Kew Bulletin*, 1890, p. 149. The tree yielding this rubber is *Sapium biglandulosum* of the natural order *Euphorbiaceæ*, a widely spread and variable species; it is also the source of Touckpong or Cumakaballi rubber of British Guiana. Case 96, Museum No. 1, contains specimens of these rubbers.

Assam rubber is the produce of *Ficus elastica*, a large tree of the *Artocarpeæ* tribe of *Urticaceæ*. The imports of Assam and Rangoon rubber (also from *F. elastica*) amounted to 350 tons in 1891. Specimens may be seen in Case 99, Museum No. 1.

Borneo rubber is afforded by species of *Willughbeia* and *Leuconotis*, allied genera of the natural order *Apocynaceæ* (see Kew Report, 1880, p. 43); 200 tons of this rubber were imported into this country during the year 1891. Samples will be found in Case 71, Museum No. 1.

African rubber is furnished by several species of the genus *Landolphia*, woody climbers of the natural order *Apocynaceæ*. The best quality from the Zanzibar coast is derived from *L. Kirkii*; two other species, viz., *L. florida* (the chief source of Mozambique rubber), and *L. petersiana* are also sources of the East African supply.

On the west coast *L. owariensis*, which has a very wide distribution, is the principal species furnishing Congo and Sierra Leone rubbers. *L. florida*, which occurs on the east coast, and *L. Mannii* also afford part of the West African supply. Liberian rubber is perhaps in part afforded by the "Abba" tree (*Ficus Vogelii*), of the *Artocarpeæ* tribe of *Urticaceæ*, and has already been fully discussed in the *Kew Bulletin* for November 1888 and May 1890.

Messrs. Hecht, Levis, and Kahn give the following statistics concerning these rubbers for 1891, viz.:—African imports, 4,350 tons; Mozambique, 380 tons; Madagascar, 300 tons. Case 71, Museum No. 1, contains samples of these rubbers.

The following review of the sources of rubber supply from the commercial side has appeared in *The India Rubber and Gutta Percha and Electrical Trades Journal*, January 8, 1892:—

There are merchantable in New York between 30 and 40 different sorts of india-rubber, the variations determining the selection by manufacturers in the purchase of stocks, says I. A. Sherman in the *India-Rubber World*. Of course, rubber in all its variations is essentially the same, differing somewhat in the same degree as the pumpkin in South Dakota from that in New England—one large and another small, one with little flavour and the other richer in food qualities. The difference between sorts of rubber, however, is due in large measure to the methods employed in gathering the sap. It happens that the natives of the Amazon Valley have always taken pains in the curing of rubber. While climatic conditions in that country may have had their influence upon the character of "Para," the condition in which this rubber is exported has become a prime factor in making it a favourite with manufacturers. On the other hand, some of the African sorts are so full of bark and stones as to make them almost unfit for use. At one time "Assams" were almost unmarketable in New York, the price sinking as low as 10 cents per pound, and not wanted at that. One firm, after long experimenting, discovered a chemical solution in which the rubber was washed, the process being that the bark and other impurities absorbed the chemicals, making them so heavy that they

separated from the gum and fell to the bottom and away. This company made a fortune in a moderate space of time; but they put up gradually the price of Assams, from the fact of their creating a demand for that sort of rubber, until the profits became comparatively small, when they disposed of the privilege of washing to some leading rubbermen, who use the process at the present day.

Para rubber is more largely consumed in the United States than any other. It may be noted, also, that the larger share of the rubber exported from Para comes to this country. There are three grades—fine, medium, and coarse. Fine Para is the standard by which all other grades are measured; it brings the best price, and probably is more used than any other. Should it become irregular in quality in the operation of curing over the smoke of palm nuts—as when little strips of virgin gum occur in the grain—it is called “medium,” and its price is lessened by a cent or two per pound.

The “coarse” is imperfect, being composed of the scrapings and refuse of the fine sorts, and sells for about two thirds of the price of the better grade. It shrinks considerably, having much water in it, and the importer generally is in a hurry to turn it over to the manufacturer. There are again many variations in Para rubber coming from different localities on the Amazon. This subject is involved in some obscurity; but the best rubber is supposed to be found on the River Purus, a tributary of the Amazon, having its source in the Andes. Brazilians, however, are apt to believe that the locality of the best sorts is unknown to Americans, and possibly the Purus may not be the locality.

There comes from Peru, at the sources of the Amazon and its tributaries, a rubber resembling the Nicaragua sheet, and called Caucho. This rubber is very wet, and consequently shrinks very much, which is a serious drawback. It is considered a good strong rubber, and it is utilised to a considerable extent by the boot and shoe manufacturers.

Of Ceara rubber, there are three grades, numbered one, two, and three respectively. It is called a “mule gum,” the significance being that it is neither one thing nor the other, it being so deficient in elasticity as to cause some to argue that it is not rubber. It is a very dry rubber, its gathering being peculiar. The tree is incised at the beginning of the dry season, and as the gum oozes from the wound it forms on the outside of the bark, to be pulled off at the end of the season. The gathering of this rubber seems to be on the wane, for every year there is an extensive migration of Ceara people to Para, bound for the forests of the Amazon.

From Bahia and Pernambuco, in Brazil, comes a rubber of a different grade from that of Para. It is cured with alum and salt water. The Pernambuco comes in sheets, and is of a yellowish-white tinge. That from Bahia is not so good, and comes in round balls. The principal objection to it is that it is very damp, entailing a large loss to the importer from shrinkage.

Of Mangabeira rubber, there are three grades, very similar to the Bahia and Pernambuco sorts. A grade that has a red look is considered superior, and sells for 5 or 10 cents per pound higher than the others.

From Central America comes a variety of rubbers, distinctive in name theoretically, but owing to the lines of transportation centering at Greytown, and the trans-shipment at that point to New York, there is much confusion, one sort often getting substituted for another. The Pacific mail steamers gather also different varieties at Panama with the same confusion. That which comes from Nicaragua is called Nicaragua

"sheet" and "scrap." The latter comes in pieces about $2\frac{1}{2}$ feet long, weighing from 10 to 40 pounds. In the gathering of rubber in the forest, around the cuts in the tree a residuum is left, which is given to the man as a perquisite, and this forms "scrap." As in the peculiar mode of gathering, it is very dry, there is little loss in shrinkage, and this quality makes it a favourite with manufacturers. It contains some bark, but not so much as the "sheet." The sheet, after it is milled and washed, is the same rubber as the "scrap." Both are cured by the use of a vine from which a soapy [*? alkaline*] substance is formed.

There is another grade which comes from Central America, containing a considerable amount of ashes, due to its being smoked over the latter. It comes in thin sheets $\frac{1}{2}$ to $\frac{3}{4}$ inch thick. It is a dry rubber, there not being so much loss in shrinkage; but it is not so firm as the other grades, and it is difficult to work. There also comes from Central American ports a rubber which is chiefly grown in New Granada, and is called "Carthagena strip." It is from $1\frac{1}{2}$ to 2 inches thick, and there is a great deal of sand and dirt in it. It is a black, tough rubber.

Honduras furnishes a great deal of rubber of the Tuno sort, which is found in many other sections of Central America. Guatemala ranks low in the American varieties, containing a resinous substance which gives it a tarry appearance. It comes in sheets pressed together. There is a rubber which comes from Angostura as good as Para. When cut it is found to contain little spots of white as large as a pea. Tuxpan, Mexico, once sent a fine grade of strip rubber; but as the trees have been destroyed by cutting them down instead of tapping for rubber, the imports from there are now very small. The rubber is gathered by scraping from the bark.

Guayaquil comes in large flakes or lumps of a whitish colour in the best sorts, the inferior sorts being porous and exuding a black liquid which stains the knife and hands. As in a great many "Centrals" the name is often confounded with the sorts.

Esmeralda comes from Guiana, is a strip rubber, and is also made into "sausages." Some brokers are of the opinion that very little of the real Esmeralda finds its way to America, it being almost indistinguishable from other grades. It brings a high price. Certainly little of it finds its way to Europe, brokers not quoting it there. A great deal of the rubber gathered in Columbia finds its way to the Amazon and Para.

In rubber from Asia the Assams probably take the lead, and are rated above coarse Para in price. There are three or four grades, the lower ones being very dirty and all of them requiring much washing.

There are two grades of rubber coming from Borneo. The rubber from that source was first called a gutta, on account of its geographical location, but this error was a palpable one, and soon corrected. It is a white, soft, porous or spongy rubber, the pores being filled with salt water or whey. The better grade is a fair rubber, but the second grade is often when cut almost as soft as putty and practically worthless.

Of Africans there are many varieties. The favourite sorts come from Madagascar. The pinky sort comes in the shape of round balls, weighing $1\frac{1}{2}$ to 4 pounds. It is not so strong as fine Para. There is always a good demand for it, and it is rarely found in store, being sold "to arrive." This sort comes from Tamatave. There are two or three variations in quality of Madagascars, but the grade called "black" comes from Majunga, is exported in small balls, and has a dark colour when cut.

From the West Coast of Africa there are many varieties, the best coming in the shape called "thimbles," which are square pieces one inch each way. The rubber is very dry, and is in good demand by mechanical goods manufacturers. It is very strong rubber, and naturally has little shrinkage. Tongues are shaped as their names indicate. There is considerable shrinkage, but it is a very good rubber. There is also a small ball rubber about $1\frac{1}{4}$ inches in diameter. It cuts white, and is fairly firm.

Congo ball is made from small strips of rubber and rolled into balls, from 1 to $2\frac{1}{2}$ inches in diameter. It is a firm and very elastic rubber, but there is more or less bark in it, and as manufacturers do not always have proper machinery to exclude it, they do not buy readily.

Sierra Leone comes in balls 3 to 4 inches in diameter, and is a very fair grade of rubber. It has a considerable demand from boot and shoe and mechanical goods men. Like all West Coast rubbers it reaches us by way of Hamburg or Liverpool.

The finer grade of Mozambique is called "white ball." It resembles Congo ball in appearance, and comes in about the same shape. The "red ball" is mixed with a reddish bark, and gets its name for that reason. Oftentimes both varieties of "ball" will be found filled in the centre with bark. The rubber is then called "unripe Mozambique," and sells for 10 cents less per pound.

From Liberia comes a lump rubber. There are three rivers in Liberia from which rubber is gathered, but it is all assembled at the common mouth and the grades are not kept separately, making a class of rubber which is very variable, and therefore disliked by manufacturers.

There is, on the whole, a growing tendency toward the use of Africans, and in this is a true check on the price of Para. In Centrals there seems to be a falling off in the production consequent upon a scarcity of labour, which has been from time to time drawn into internal enterprises. In Europe the stocks of Africans are always larger than of Para, and a steady growth is very noticeable.

CCXXXVII.—MISCELLANEOUS NOTES.

A set of some 2,000 species of the late Dr. J. Triana's New Granadan plants has been purchased for the Herbarium. Dr. Triana worked at Kew on this collection of plants, especially the *Melastomaceæ*, on several different occasions and altogether for a considerable period, but other duties prevented him from continuing his botanical studies, and the flora of New Granada on which he was engaged came to a standstill from want of funds. He presented Kew with a set of his plants, as far as he had worked them out.

A small but excellent collection of Dahurian dried plants, made by Mr. F. Karo, has also been acquired by purchase. The flora of this region is tolerably well known, though not very fully represented in the Herbarium by really good specimens.

From the Berlin Herbarium (Dr. A. Engler, Director,) has been received a further donation of duplicate dried plants, including upwards of 200 species from New Guinea, and a smaller number of novelties. The Germans are actively collecting in their African and New Guinea possessions, and the Berlin botanists are equally active in publishing the results.

After a rather prolonged delay the Commission for the Delimitation of the Anglo-French frontier in the neighbourhood of Sierra Leone was appointed, and Captain Kenney, R.E., the British Commissioner, with his party, proceeded to Sierra Leone in November last. The Secretary of State for the Colonies permitted the Director of Kew to nominate a botanist to accompany the expedition, and the Government Grant Committee of the Royal Society made a grant to meet his expenses, part of which will also be borne by the Government of Sierra Leone. The mission has been undertaken by Mr. G. F. Scott-Elliott, M.A. Camb., B.Sc. Edinb., F.L.S., who has made collections in Madagascar and published the results in the Journal of the Linnean Society. The botany of the interior of Sierra Leone is very little known, but it is believed to be of great interest. So far Mr. Scott-Elliott has forwarded to Kew in five consignments about 500 species of dried plants in excellent condition, and also seeds of various kinds. The critical examination of these collections will be deferred until Mr. Scott-Elliott's return.

Mr. H. Millen, Curator of the Botanical Station at Lagos, on leave in this country, brought home a small collection of dried plants, which have been determined. Among them are good specimens in fruit of *Usteria guineensis* and of *Urophyllum* (*U. hirtellum*, Benth.), but the majority are the common plants of the tropics.

Calostemma album, R. Br.—Two large bulbs of this rare and interesting plant (natural order Amaryllideæ) were recently received at Kew in excellent condition from Sir Ferd. von Mueller, K.C.M.G., Government Botanist, Victoria. They were obtained from Turtle Islands by the Honourable John Douglas, C.M.G., resident magistrate, Thursday Island, who made a special voyage to obtain them. The plant is not known from any other locality. Baker, *Handbook of Amaryllideæ*, p. 132 describes it as somewhat similar to *Euyces Cunninghami*. It has not before reached this country in a living state, and considerable interest will be attached to it when it first comes into flower.

ERYTHROXYLON COCA.—As there is still some demand for this plant among correspondents in tropical countries, attention may be called to the fact that fresh seeds of it may be sent long distances without losing the power to germinate. A quantity of seeds of the typical plant, with broad-pointed leaves, received at Kew from Ceylon on January 29th, and sown at once in a tropical house, have germinated freely. They were packed in a small tin box in slightly moist soil and sent from Ceylon by post. Plants of *Erythroxylon* do not travel well in Wardian cases.

Mahogany cutting is one of the chief industries of British Honduras. The export of timber varies from about 4,000,000 feet to about

6,000,000 feet per annum. The annual value is about a quarter of a million sterling. The mahogany forests are cut over once in about fifteen years. The trees are selected and cut down generally above the large slab-like buttresses which grow out of the base of the stem. They are then squared into convenient logs and drawn on heavy trucks to the nearest stream. The broad, massive wheels of these trucks are sometimes cut out of the slab-like buttresses of the mahogany trees or by sawing pieces across the stems of Santa Maria trees (*Calophyllum Calaba*). Recently Sir Alfred Moloney, K.C.M.G., Governor of British Honduras, forwarded to Kew two truck wheels that have been in use in the mahogany forests, consisting of cross sections, about 12 inches thick, of mahogany and Santa Maria trees. These are roughly trimmed and pierced for the axle.

A monograph on the wood manufacturers of the Punjab was recently received from the Government of the Punjab and its dependencies [Lahore, 1889]. Amongst the articles described were many not included in the Museums of Economic Botany at Kew. It was desirable to obtain these to illustrate the use in the Punjab of various local woods and timbers. The Government of India has lately obtained most of the articles desired, and others are in course of being procured. The articles received consist of native combs made of the following woods:—*Tamarix orientalis*, *Flacourtia sapida*, *Holarrhena antidysenterica*, and *Ougeinia dalbergioides*. The collection also includes sword scabbards made of the soft, light wood of *Bombax malabaricum*, and lacquered boxes, the wood chiefly used being *Dalbergia latifolia*.

CASUARINA EQUISETFOLIA, Forst. (*C. muricata*, Roxb.), is known as the Beefwood tree. It is fast-growing and yields excellent timber. It has been successfully established in large plantations in the neighbourhood of Madras, and it thrives in poor sandy soil close to the sea. Colonel Campbell Walker, Conservator of Forests, Madras, estimates the yield of firewood from this tree for locomotives and other purposes, to be four times as great as the return from any tree grown for the same purpose in France. The timber, although somewhat heavy, is valuable also for building purposes. The tree is not attractive in appearance on account of its thread-like jointed branches without leaves, but it withstands strong winds, and it may be usefully employed if planted thickly, to form shelter-belts against sea-breezes, to mask earth-works and batteries, and even to drain somewhat boggy saline lands. In these respects it is much superior to the Blue-Gum tree (*Eucalyptus Globulus*) which is not at all suited to tropical conditions. During the last two years efforts have been made to establish *Casuarina* trees on the West Coast of Africa. Large supplies of seed have been received through the India Office from the Agri-Horticultural Society of Madras, and the seed has been distributed from Kew to all the West African settlements.

The Annual Report of the Botanical Department, Jamaica, for 1890, contains an interesting notice of the Botanical Gardens at Castleton, about 19 miles from Kingston. This is the tropical garden of the Colony. The *Jamaica Post* reviews this notice as follows:—Mr. Fawcett in his account of the state of the Castleton Gardens writes with all the animation of a good guide-book to the place. "The

garden," he says, "has attracted a large number of visitors. During 18 months, 896 names have been entered in the visitors' book, or on an average of 50 a month. Those who come from abroad, and more especially those from temperate regions, are very much struck with the beauty of the garden and the interesting character of the plants growing in it. Mr. Morris, who was here in February, said that he had not seen as pretty a garden since he left Jamaica. Mr. William Saunders, Superintendent of Gardens, Agricultural Department, Washington, when he heard that it had been in contemplation a few years ago to give up the garden, remarked that to do so would be like burning down a picture gallery. But those also who live in Jamaica, and are accustomed to tropical vegetation, appreciate the pleasure and profit to be derived from a visit. The drive from Kingston, though a long one, is full of interest, first through the Liguanea plains, then up Stony Hill, past Settlers' groves of cocoa, coffee, and bananas, with a sprinkling of oranges, akees, sugar cane, annatto and yams; down into the Wag Water Valley with broad alluvial stretches covered with tobacco, cultivated by Cubans; along the winding river, fringed with clumps of graceful bamboo plumes, and its banks hidden by masses of creepers; past the rocks by the roadside covered with ferns and mosses, the scarlet 'dazzle' *Euphorbia* (*Poinsettia pulcherrima*) and the blue 'forget-me-not' of Jamaica (*Browallia*) until Castleton is reached, where 'art shows nature at its best, by 'world-wide selection and harmonious combination.'

"A guide-book that took in all the Jamaica gardens in the manner of the above paragraph, would be useful, and would add to the number of visitors to all of them. Of the plants in the garden at Castleton some most interesting information is supplied. 'One of the most superbly beautiful of trees,' says Mr. Fawcett, 'the *Amherstia nobilis*, was in magnificent flower this year, and was worth crossing the globe to see. Though covered with its long pendent bunches of vermilion and yellow flowers, it only yielded a few seeds. It is a native of the Malay Peninsula, and naturally prefers a moist climate. One of the Iron Woods of India, *Mesua ferrea*, also attracts attention from the red colour of the young drooping foliage, and the large fragrant white flowers. It has not yet ripened seed. The Mangosteen, *Garcinia Mangostana*, the fruit of which in its native country is said to be the most delicious in the world, yielded a small crop again this year. It requires a damp and hot atmosphere, and probably the eastern end of the island would be the most suitable situation in which to cultivate it. The Traveller's Tree of Madagascar (*Ravenala madagascariensis*) is the noblest form of that essentially tropical family—the banana order (*Musaceæ*). The leafstalks contain water, a merciful provision for the thirsty traveller.'"

The *Colonial Standard*, January 18, 1892, discusses an important matter connected with the Jamaica Botanical Gardens as follows:—The first step in this Colony towards the technical education of the young, in agricultural matters at least, has been initiated at the Industrial School at the Hope Botanical Gardens. The boys there have, by the direction of his Excellency, who has always evinced a hearty interest in whatever relates to the agricultural welfare of the Colony, been trained under a skilful instructor in the mysteries of cocoa curing,

a science which is yet in its infancy in this island, and through ignorance of which incalculable loss is sustained to growers. His Excellency has directed that a quantity be dried and cured at Hope and sent to the London markets to compete with the ordinary triage produced by the peasantry by the rule of thumb methods, which at present characterise the manipulation of the bean in the country. The prices obtained will be published in a comparative statement to show growers how much is lost by ineffective methods of drying and curing. The Botanical Gardens or land, under cocoa cultivation at Hope, do not suffice to produce the quantities of cocoa that can be handled by the boys, and consequently recourse has to be had to the small growers who sell the bean in the pod. More education of a technical and less of a classical nature would result in producing such an impetus as would put Jamaica into the forefront of the race for commercial supremacy among cocoa and coffee growing countries. The usefulness of the Institution at the Hope is making itself felt in a very tangible way, but similar training classes must be established all over this island before the result desired can be attained.

Another interesting experiment is being tried at the Hope Gardens in the training of two respectable young Africans destined eventually to take charge of Botanical stations on the west coast. Mr. Fawcett reports upon them as follows:—

“The Government of Lagos has sent here two apprentices to be trained in practical work at the Botanical Gardens in Jamaica, with a view of hereafter appointing them as ‘working superintendents of the district branches or outstations’ in their own country. They were about 19 years of age when they arrived, and had received a fair education. A room is granted to them at Hope Gardens, and their Government allows them each a provision of 50*l.* per annum. I have from the commencement of the negotiations on the subject made it clear that it was not possible with the present staff to undertake any tuition, but that if the apprentices had received a good education, they would be able to read and understand such books as were given them treating of the fundamental principles of gardening and agriculture.

“The plan has been carried out, and so far has proved satisfactory. The apprentices have worked in the Hope Gardens, as gardeners work in the Kew Gardens. They are learning the elementary practice of gardening, and the use of tools, and are as far advanced as can be expected after less than a year’s work. I am satisfied with their industry in this respect, and expect that after another two years they will be fairly proficient.”

In a note in the *Kew Bulletin* for October, November 1891, p. 277, it is stated that efforts had been made at Kew for some years to introduce the “butter-nut” of British Guiana (*Caryocar nuciferum*) to the tropical parts of the Old World. The following report from Mr. W. Soutter, Secretary of the Acclimatization Society of Queensland, dated Brisbane, January 19, 1892, shows that in that Colony the effort so far has been successful:—

The box containing seeds of *Caryocar nuciferum* came safely to hand, and I am directed by the Council to thank you for the same.

Several plants were raised here from seeds furnished by your gardens some years ago. The latitude of Brisbane is, however, not conducive to the perfect growth of the “butter-nut.” It thrives well in more

northern latitudes, to wit, the "Johnstone River." A pair of plants sent there have done remarkably well; the majority of the present lot will finally reach that locality.

We are having splendid crops of fruit this season, of all sorts. There is a phenomenally heavy crop of Litchis (*Nephelium Litchi*), the heaviest ever known here. Grapes are selling at one farthing a pound; mangoes at 6d. to 8d. per dozen; persimmons are better at 3s. to 5s. per doz.; pine-apples at 1s. to 3s. per doz.; bananas are practically unsaleable. Queensland has had one of the best growing seasons it has enjoyed for the past 15 years.

Gambier (*Uncaria Gambier*, Roxb.) was fully discussed in the *Kew Bulletin*, 1889, p. 247. The interest in this valuable tanning plant appears to be maintained, and efforts are being made to establish its cultivation in other countries. The following interesting report from Mr. Henry Walker, Commissioner of Lands, Sandahar, has been communicated to Kew by Mr. William M. Crocker, the manager of the British North Borneo Company, 15, Leadenhall Street, E.C. :—

"I am pleased to report that the Gambier plantation on the Crocker Road of which I took charge in September appears likely to be a great success. Up to the end of September, 100 pepper cuttings and a few Gambier plants had been planted, and have since been increased to 587 pepper cuttings and 3,020 Gambier plants; of the latter there has not been a single failure and all are growing remarkably strong and well, generally with more than one shoot. The Gambier Hill has just been cleaned up and the plants appear about 16 inches to two feet above the ground. The Chinese gardeners speak enthusiastically of the growth of the Gambier, and say it beats anything they ever saw in Singapore, and they expect to take a cutting at 10 months old.

The troubles we have had in getting pepper cuttings from Singapore have prevented any extensive plantings, but I have just received 1,155 pepper cuttings through Mr. Joseph Wheatley by one of the Chinese gardeners whom I sent to collect cuttings at Bunda. These have arrived in very good order.

Since my return I have taken in hand the distribution of economic plants, and as I found a large number of coffee seedlings under the trees in the Silam gardens, I arranged to have some boxes sent up by each trip of the "Normanhurst." The Ceylon coffee seeds bought by me are not yet all to hand. Mr. Dunlop writes me from Penungah (acknowledging some seeds) to say he has found three coffee trees planted at Senanghal two years old and bearing well. They were planted by Hadii-Moussa at my request.

I have laid down a large quantity of Gambier seed, but it takes a few months' time before it is available for planting, and I am taking two Chinese to Labuan who will collect pepper cuttings and return as soon as possible. We shall then be able to carry out the object with which the garden was started, viz., the distribution of pepper cuttings and Gambier plants, and later on we shall be able to collect our own Gambier seed, which will be a boon as it suffers from the transport from Singapore. I gave some Gambier seed to one of the estates in Marudu Bay to make a trial planting and to ensure a supply of seed for that district. I am taking some to the west coast to give to the pepper planters.
